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**Innovation,
Network Centric Warfare
and the
Military Professional**

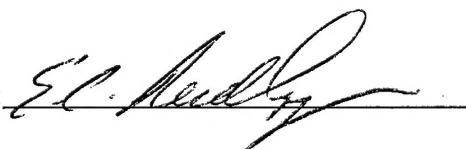
A Mistaken Self-Perception of Innovative Spirit?

By

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A paper submitted to the Faculty of the Naval War College in partial satisfaction of the requirements of the Department of Joint Military Operations.

The contents of this paper reflect my own personal views and are not necessarily endorsed by the Naval War College or the Department of the Navy.

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Abstract of

INNOVATION, NETWORK CENTRIC WARFARE AND THE MILITARY PROFESSIONAL: A MISTAKEN SELF-PERCEPTION OF INNOVATIVE SPIRIT?

Historically, military innovation is a difficult process, argued and counter-argued not only on the merits of the proposed innovation, but also stilted by the organizational and personal biases of the military and its members. The proposal of Network Centric Warfare (NCW) has generated the normal resistance, but being a difficult concept to grasp, and one that is easy to confuse with “simple” information technology, the debate has lost focus on the core issues of the concepts of NCW and instead drifted to a peripheral issue—the network infrastructure. In addition, the self-perception of the military professional is one of being innovative, yet this is probably not the case for the majority of the group.

This paper is an attempt to highlight the need for the military professional to remain receptive to innovation and to enter the argument well informed and focused on the correct concepts. In addition, proponents of NCW must ensure their ideas are presented in a manner conducive to focusing the debate on the core issues. NCW is an unproven proposal, but an important one as it has the potential to alter our future as a military, for the better, or if a flawed concept, for the worse.

It is not necessary to change. Survival is not mandatory.

-W. Edwards Deming

To change and to change for the better are two different things.

- German Proverb

Introduction

Most military professionals perceive themselves as open-minded, innovative, and receptive to new ideas. However, reality and practice lead many observers to a different conclusion—the military organization, and the people in it, are, by and large, conservative, resistant to change and receptive to evolutionary, not revolutionary change.¹ Historical case studies of military innovation as well as the current debate over the concept of “Network Centric Warfare” support this assertion. Real innovation in the past has not come easily. Innovation today is no simpler a task.

The risk involved in innovation is real. As the two quotations above allude, there are two sides (or more) to any debate about change, or innovation. An organization that does not adapt runs the risk of becoming obsolete and trampled underfoot by the march of progress. On the other hand, if huge risks are taken on unproven concepts, which eventually turn out to be erroneous, the consequences can be just as dire. For an example of the former, review the lack of Allied efforts in anti-submarine warfare prior to World War II, and the resulting devastation inflicted by unimpeded German U-boats. For the latter case, an example of an innovation that proved to be tragically flawed,

¹ Bryon E. Greenwald, “The Problems of Peacetime Innovation: The Development of US Army Antiaircraft Artillery During the Interwar Period—A Case Study in Preparing the Army for the Future”, (Unpublished Monograph, School of Advanced Military Studies, United States Army Command and General Staff College, Fort Leavenworth, Kansas: 1995), 1.

examine the useless French “Maginot Line” defense against the Nazi invasion of the same war.² Brutal lessons from the past highlight the risks associated with innovation—especially in the military arena.

Informed debate and discussion of new ideas is necessary to reduce the risks involved. Yet in the case of Network Centric Warfare (NCW), misperceptions abound. Part of this difficulty stems from the fact that many in the military see no problem for NCW to solve. “If it ain’t broke, don’t fix it” is one prevailing attitude. Most don’t understand the concept- they confuse information technology (often difficult in itself to understand) with NCW—a serious error. As a result, the focus of the debate often centers on the “network infrastructure” aspect of Network Centric Warfare, not on the concepts, process and end results.

To be innovative does not mean that one must accept every new idea that comes along—it just means one must honestly consider it.

Why Yes, I’m Innovative

It is terrible to destroy a person’s picture of himself in the interests of truth or some other abstraction.

-Doris Lessing

Don't worry about people stealing an idea. If it's original, you will have to ram it down their throats.

-Howard Aiken

At a recent Naval War College forum on the subject of innovation, the audience, consisting mostly of military officers, was asked, “Do you consider yourself innovative?” A rough estimate of the raised hands indicated that 95% of the group thought they were

² Ibid., 3.

innovative.³ Yet most sociologists, psychologists and others who have written on the subject have come to the conclusion that almost any organization is resistant to change, and the military is no exception.⁴ As B. H. Liddell Hart (and some proponents of NCW) observed, "The only thing harder than getting a new idea into the military mind is getting an old one out." The question of why the military professional carries this misperception is left to other works, but this conservatism is not all bad—the cost of a failed concept can be high, counted in human lives. On the other hand, opposing new ideas for the wrong reasons, and with insufficient knowledge can stifle needed innovation. Fears of losing one's prestige or power in the advance of an idea are morally and professionally wrong, but commonplace in history. Bryon Greenwald writes of a classic example, "The father of German armored warfare theory, General Heinz Guderian commented in *Panzer Leader* that neither the establishment of an independent air force or the development of armored doctrine was adequately studied or appreciated by the General Staff because it feared it might result, 'in the one case, in a decrease in the importance of the Army as a whole, in the other, in a lessening of the prestige of the older arms of that service.'"⁵

Another well-known example of practical innovation being fought tooth-and-nail by the military establishment was the introduction of airpower as a strategic weapon. Brigadier General William "Billy" Mitchell was the fiery advocate for the increased role of aircraft—he was court-martialed for his efforts. A lesser-known case involved the

³ Author's personal observation, "Strategic Change, Transformation and Military Innovation", Conference, U.S. Naval War College, Newport, RI: 10 March 2000.

⁴ Greenwald, 22; Vincent Davis, "The Politics of Innovation: Patterns in Navy Cases", (Unpublished monograph, University of Denver, Denver, CO, 1966), 1.

⁵ Greenwald, 25-26.

development of ship-based missiles. In the mid-1950s, a small group of naval officers were pushing for development of missile systems aboard Navy vessels. However, there “were many naval officers who generally opposed a new emphasis on missiles, some because they questioned the Navy’s need for missiles, some because they questioned whether basic scientific and technological research had made enough progress to warrant a new emphasis, and some because they were apprehensive that a new emphasis on missile development would mean a decreased emphasis on other high-priority Navy programs....”⁶ Their “pet” programs.

From a current perspective, the challenge NCW potentially represents to the continued dominance of manned tactical aircraft, aircraft carriers and major surface combatants tests the character of operators of these, and many more platforms. NCW, if implemented, will bring about a vastly different form of military art than today’s methods. Today’s officer career paths may no longer be valid. Thus the traditional impediments to innovation are present. Today’s professional will have to overcome personal biases if he or she is to become a part of the debate, and argue the merits or flaws of the concept. More importantly, the professional must become informed. Dismissing NCW due to ignorance or misconceptions of the concept do little service to the military. David S. Alberts, John J. Garstka, and Frederick P. Stein review “NCW Myths” in their book about the subject.⁷ The most common misperceptions are cited

⁶ Davis, 33.

⁷ David S. Alberts, John J. Garstka, Frederick P. Stein, Network Centric Warfare: Developing and Leveraging Information Superiority, 2nd Ed. (Washington, D.C.: C4ISR Cooperative Research Program, 1999), 5-13.

below, and an attempt at an alternate explanation is attempted, with apologies to the original authors.

“NCW? It Ain’t Gonna Work”

The people who oppose your ideas are inevitably those who represent the established order that your ideas will upset.

-Anthony D’Angelo

Most of us are about as eager to be changed as we were to be born, and go through our changes in a similar state of shock.

-James Baldwin

One might ask, “how does the Fleet feel about Network Centric Warfare?” One would receive a variety of answers. Many have only heard the term. Others are vehemently opposed, and others support the concept. A large number of military officers have a vague idea of the principles of NCW, but many are incorrect in their basic understanding. There exists an ongoing, lively debate in professional journals over the potential efficacy of NCW, with thoughtful counter arguments from Colonel T. X. Hammes, Commander Alan D. Zimm, Thomas P. M. Barnett and others.⁸ Such debate is healthy and desirable in the decision-making process.

It has been observed, however, that many of the detractors of NCW, especially those who dismiss it out of hand, have an incomplete idea of the concepts of NCW. The primary error, in this author’s opinion, is equating Network Centric Warfare with

⁸ Thomas P. M. Barnett, “The Seven Deadly Sins of Network-Centric Warfare,” U.S. Naval Institute Proceedings, January 1999, <<http://www.usni.org/Proceedings/Articles99/PRObarnett.htm>>, (19 April 2000); T. X. Hammes, “War Isn’t a Rational Business,” U.S. Naval Institute Proceedings, July 1998, <<http://www.usni.org/Proceedings/Articles98/PROhammes.htm>>, (19 April 2000); Alan D. Zimm, “Human-Centric Warfare,” U.S. Naval Institute Proceedings, May 1999, <<http://www.usni.org/Proceedings/PROspecials99.htm#MAY1999>>, (19 April 2000).

Information Technology. Dismissals such as "Heck, all it means is more e-mail, and we already have too much of that", or "It's just going to be too much information for any person to handle—it ain't gonna work". Even some of the more informed participants in the debate are misguided in this crucial area:

“...NCW envisions providing internet-like connectivity to users from the tactical through the strategic levels. Information will be processed and interchanged at truly incredible rates.

But one major element appears neglected: Where is the human?

There are fundamental questions--so far largely ignored--about how humans fit into the ... NCW picture. The human user is the key element, yet our concentration is more on hardware, bandwidth, baud rates, and wires and electrons.”⁹

Here the writer equates NCW to “more information”, and argues that human factors considerations will have to be designed into the systems that comprise NCW. To an extent, he is correct. But NCW will take the human out of the system when the human adds no value to the solution. The statement that “our concentration is more on hardware, bandwidth, baud rates, and wires and electrons” is exactly not what NCW is all about. What it is about (at least this author's viewpoint) will be discussed in the following section.

Another writer points out that war is irrational and unchanging—friction and the fog of war will never be subdued. He points to recent examples where current technology has failed- Somalia and the search for weapons of mass destruction in Iraq. In arguing against the concept of NCW, he blames the weaknesses of current information technology.¹⁰ He is correct in highlighting the deficiencies in current information technology—yet equating current information technology (IT) to NCW is like equating

⁹ Zimm.

¹⁰ Hammes.

horse cavalry to maneuver warfare. Horses were just one transitory means of enabling the overarching concept of maneuver warfare—it's not the horses, or the computers, fiber optics and bandwidth that matters, it's the process that these means enable.

Another strong impediment to consideration of NCW concepts is a form of “techno-phobia”, for lack of a better term. By no means is this “phobia” pervasive, but it is common enough to affect not only NCW, but basic IT improvements as well. Anthony DiGiorgio provides an example in “The Smart Ship Is Not the Answer”: “The *Spruance* (DD-963) class...was designed as an automated platform, to be operated with minimal crews. But only one naval officer, the commissioning chief engineer of the *Briscoe* (DD-977), in June 1978, ever actually operated the ship the way it was designed. He locked the doors to the engine rooms and sailed the ship with unmanned engine rooms.”¹¹

In other instances, some mid-grade and senior officers have their e-mail printed out by their staff, the officer hand writes a reply, and returns it to his staff for transmission.¹² It seems to be the “blinking 12:00 O'clock on the VCR syndrome”. Some people just don't want to learn how to use new technology. Whether it is fear of not being able to master the new tools, or a reluctance to break with tradition, military professionals must be able to advance with technology.

It's Time to Drink the Kool-Aid

Proof of Trotsky's farsightedness is that none of his predictions have come true yet.

-dedicated follower of Trotsky

¹¹ Anthony DiGiorgio, “The Smart Ship Is Not the Answer”, U.S. Naval Institute Proceedings, June 1998, <<http://www.usni.org/Proceedings/digiorgio.htm>>, (19 April 2000).

¹² Author's personal observation

It is the fierce determination of the drive to close with the enemy, not the mechanical perfection of the tank that conquers the trench.

-General George S. Patton

Currently, NCW can be almost anything anyone wants it to be. In describing NCW, Vice Admiral Arthur K. Cebrowski and John J. Garstka write, ““We are some distance from a detailed understanding of the new operations--there is as yet no equivalent to Carl von Clausewitz's On War for this second revolution.”¹³ In other words, this concept is just a vision at the present time. We have not implemented it, and, more importantly, there is no consensus on how to implement it. More development of both the concept, and less importantly, the underlying technology, is still to come. This type of thinking is true in many cases of innovation in the past. Vincent Davis in “The Politics of Innovation: Patterns in Navy Cases,” writes, “in many cases the proposed innovation requires things that have not in fact yet been invented, but which the innovation advocate assumes can be brought into being if work (i.e. R&D¹⁴) is performed in the urged direction.”¹⁵ To some, the need to “schedule an invention” rankles, yet this has been the course of many innovations in the past. The adage, “necessity is the mother of invention” still applies.

So, one must say, “I BELIEVE!” regarding the future infrastructure of NCW- the “network”. It’s not important, at this point, what that network consists of—computers, wires, whatever. It could consist of (tongue planted in cheek) particle beam transmitters,

¹³ Arthur K. Cebrowski and John J. Garstka, “Network-Centric Warfare: Its Origin and Future.” U.S. Naval Institute Proceedings, January 1998, <<http://www.usni.org/Proceedings/Articles98/PROcebwski.htm>>, (19 April 2000).

¹⁴ Research and Development

¹⁵ Davis, 51.

alien technology or a network of psychics—whatever it will be, it's in the future, and the debate picks up with the belief that it will carry data quickly, reliably and securely. Sure, most likely it will be an evolution of our current computer network systems, but the argument should not focus on the infrastructure. The important point is the process, the concept of NCW. In other words, given that the network functions to carry data, what do you do with the data and how do you do it? This end product is called the "Mission Capability Package" in some NCW writings.¹⁶ This is where the debate should lie.

"If anything, the technologies influencing civilian life in the next century may have even greater impact on military force than has been true in this century." write Murray and Millett, in Military Innovation the Interwar Period.¹⁷ In other words, the normal processes of military innovation are in themselves changing. The forecast from these and other scholars is that the military will gain more from the civilian explosion of technology rather than vice-versa. If you take the Navy's IT-21¹⁸ concept of today, for example, the point is made. Almost everything comprising IT-21 comes from commercial sources.

This leads to the civilian applications of rudimentary network-based commerce cited by Arthur K. Cebrowski and John J. Garstka in their article introducing NCW. Despite the stiffened jaws of some military professionals who immediately discount any relevance the business community has to warfare, the examples are a valid means to

¹⁶ Alberts and others, 6.

¹⁷ Williamson Murray and Allan R. Millett, ed., in Introduction to Military Innovation in the Interwar Period (Cambridge, U.K.: Cambridge University Press 1996, Paperback ed. 1998), 1.

¹⁸ IT-21 is the Navy's push to put modern ADP systems aboard ships and shore commands, and upgrade the way we send, process and use information.

describe the basics of netcentric operations. I will attempt to take one of their case studies briefly describe (and modify) it, and then relate it to a military application. I will add more automation to both case studies than most NCW proponents propose, but only to show the important point that NCW does not just deliver information—it processes it, and can make some decisions with it, based on rule sets.

One study involved Wal Mart and it's logistics support in the case of a customer buying a light bulb. The scenario starts with a customer buying a light bulb. The checkout attendant scans the bulb's barcode. NOTE: this is the last human interaction in the process until a replacement light bulb is on its way to Wal Mart. Here's how: the scanned information of the sale of the light bulb is automatically entered into multiple systems- accounting, marketing, and importantly for our purposes, the "logistics" system. The need for a replacement bulb is "known" by the system. Wal Mart's purchasing computers contact and electronically "negotiate" the lowest price from multiple light bulb manufacturers' sales computer systems.¹⁹ The vendor with the lowest price is identified, and an order for a light bulb is placed. The vendor's sale's computer system automatically enters the order into multiple systems, including the manufacturing network. At this point, the time elapsed from customer purchase of the bulb back at Wal Mart could be just a matter of a few seconds (for our example). No human interaction is required, or desired. It would only slow the process down. Back to the light bulb—it is manufactured and packaged (with a shipping label addressed to the Wal Mart) by machines, and finally, a human again enters the picture—the UPS guy to pick up the

¹⁹ This business-to-business price negotiation process was not described in the original article by Cebrowski and Garstka, but is a technology in emerging use today. It is included here for illustrative purposes.

package and deliver it to Wal Mart (UPS uses their own netcentric system to gain efficiencies in their business, but we will skip them for brevity's sake). This is one application of netcentric operations. This one purchase is duplicated thousands of times a day, with the total process being optimized for economy. Note that there is no "e-mail" for managers to read and act upon, no overwhelming information coming at them for decisions—the network handles the process.

So how does this apply to warfare, one might wonder? Using a very simplified, yet extreme example (again, automation is cited to a much higher degree than most NCW proponents propose), here's how: suppose the United States is in armed conflict with an opponent. The U.S. Joint Task Force commander's operational plan includes the destruction of hundreds of key economic, infrastructure, and military targets (the NCW "system" could have identified these targets). Singling out the mission against just one target, we see the commander go to his network console, call up the common operational picture, and place his cursor over the target. "Double clicking" brings up imagery of the target. He designates the wing of the building he wants destroyed, and enters a time-on-target. The "system" evaluates whether forces are available for this mission, and the time involved. It notifies the commander that the earliest time-on-target will have to be delayed by two hours. The commander accepts, and authorizes the mission. The "system" notifies the forces involved, or more precisely, their networks. Sensors are moved to optimum locations, as well as engagement platforms. Among these engagement platforms, a cruise missile-carrying ship is automatically vectored to its launch basket, and a squadron of unmanned strike aircraft are receiving mission guidance from the "system". Humans operators are also notified of the impending strike, although such

guidance may be as simple as "load 15 unmanned strike aircraft with four JDAM each, and prepare them for launch at 1630Z", or, "your ship is being steered to a cruise missile launch basket at position 36N/116E. Time of launch is 1645Z". The ship is vectored via optimum routing, with the "system" steering around shipping, hazards to navigation and enemy threat. When on station, the missile is launched automatically. The combined munitions of the various platforms in the network arrive on target, on time. Target destroyed. This is just one of many such missions of the day- the "system" would have sequenced movements of forces and times on target to realize maximum mission effectiveness for the minimum expense.

Far-fetched? You bet! Can it be done? Is it the right way to fight wars in the future? Will it work in all scenarios, including Military Operations Other than War (MOOTW)? The answer to these questions: maybe. Do we need to explore this concept further? Yes!

To reiterate a major misunderstanding of NCW, note that e-mail is not the means to disseminate the majority of the information. Most of the information does not even reach humans—the "system" processes it, and acts on it. The drawbacks of "information overload", and the stress it places on human decision makers is not a factor. Note the words of General Gordon R. Sullivan, former Army Chief of Staff on the impact of information technology on warfare: "What is new is the realization of the power we gain by *integrating* (emphasis added) those digital systems throughout the force. *Integration* allows us to execute with true precision to mass effects, not forces."²⁰ If automation

²⁰ John R. Wood, "Transition into the Information Age: Opportunities, Lessons Learned, and Challenges" in *War in the Information Age, New Challenges for U.S. Security Policy*, ed Robert L. Pfaltzgraff, Jr. and Richard Shultz, Jr. (Medford, MA: International Security Studies Program, The Fletcher School of Law and Diplomacy, Tufts University, Brassey's Washington/London, 1997), 122.

were not used to the extent in the example, the information would be presented to the human operator in a format that is natural and easy to understand (other than pure text, hopefully). This is one of the principles of NCW.

Enhancing the Debate

In a time of drastic change it is the learners who inherit the future. The learned usually find themselves equipped to live in a world that no longer exists.

-Eric Hoffer

So how can the debate over NCW be focused on the core issues? Two groups must take action to enhance this vitally important examination of a potentially new era in operational art. First, the proponents of NCW must concentrate on education and explanation of the concept in terms meaningful to the military professional. Avoid this mistake: in one of the major works by proponents of NCW, e-mail between Sailors and families and video teleconferencing by commanders are incorrectly cited (in this author's opinion) as examples of NCW.²¹ Those examples are merely advances in information technology. This is true because the way the information is processed remains the same as the old technology. The Sailor must open an e-mail, read the text, ponder the ideas, and write a reply, in much the same manner as he or she did ten years ago, but with postal mail. And the commander's video teleconference is just a meeting, but using images instead of attending in person. The information presented in the conference and the way it is processed is no different from a physical meeting. This one erroneous concept is a major impediment to the general populace of military professionals attempting to grasp

²¹ Alberts and others, 109, 112.

the unique concept of NCW- it is often incorrectly equated to information technology. They see the commander as already having too much information to handle today—why add more data to the problem, they ask?

Secondly, proponents of NCW need to “market” their ideas in a short, simple, easy to understand manner. Quite possibly these marketing tools (glossy brochures, short videos, for example) will not be an exhaustive review of NCW concepts, but they should stimulate interest and get the neophyte started down the right path to understanding. Too often articles on NCW are difficult to understand, as evidenced by the published counter-arguments.

Finally, the military professional must be honest with himself/herself on their degree of open-mindedness. The self-perception of being innovative may not be true. They must realize that fact and force themselves to become informed, consider the arguments before them, and take a meaningful part in the debate.

Conclusion

*A powerful idea communicates some of its strength to him
who challenges it.*

-Marcel Proust

The concept of Network Centric Warfare has stirred much argument and counter-argument. A large portion of the debate, however, is focused on the infrastructure of NCW, and not the concepts of the end result. Military professionals on both sides of the argument must ensure that the debate is based on true understanding of the concepts, and not misperception and ignorance. Many military members will have to re-evaluate their

sense of innovation during this process, and ensure they are approaching the argument with an open mind.

NCW proponents must ensure their ideas are clear and concise; focused on the core of the NCW concept, and not on the peripheries. The consequences of a wrong decision in implementing NCW will carry long-term consequences for the military and the nation. It is too important not to get involved.

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